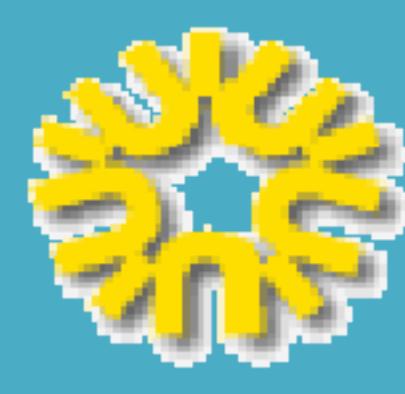


Monitoring Whitebark Pine in the Frank Church River of No Return Wilderness Area



University of Idaho



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Introduction

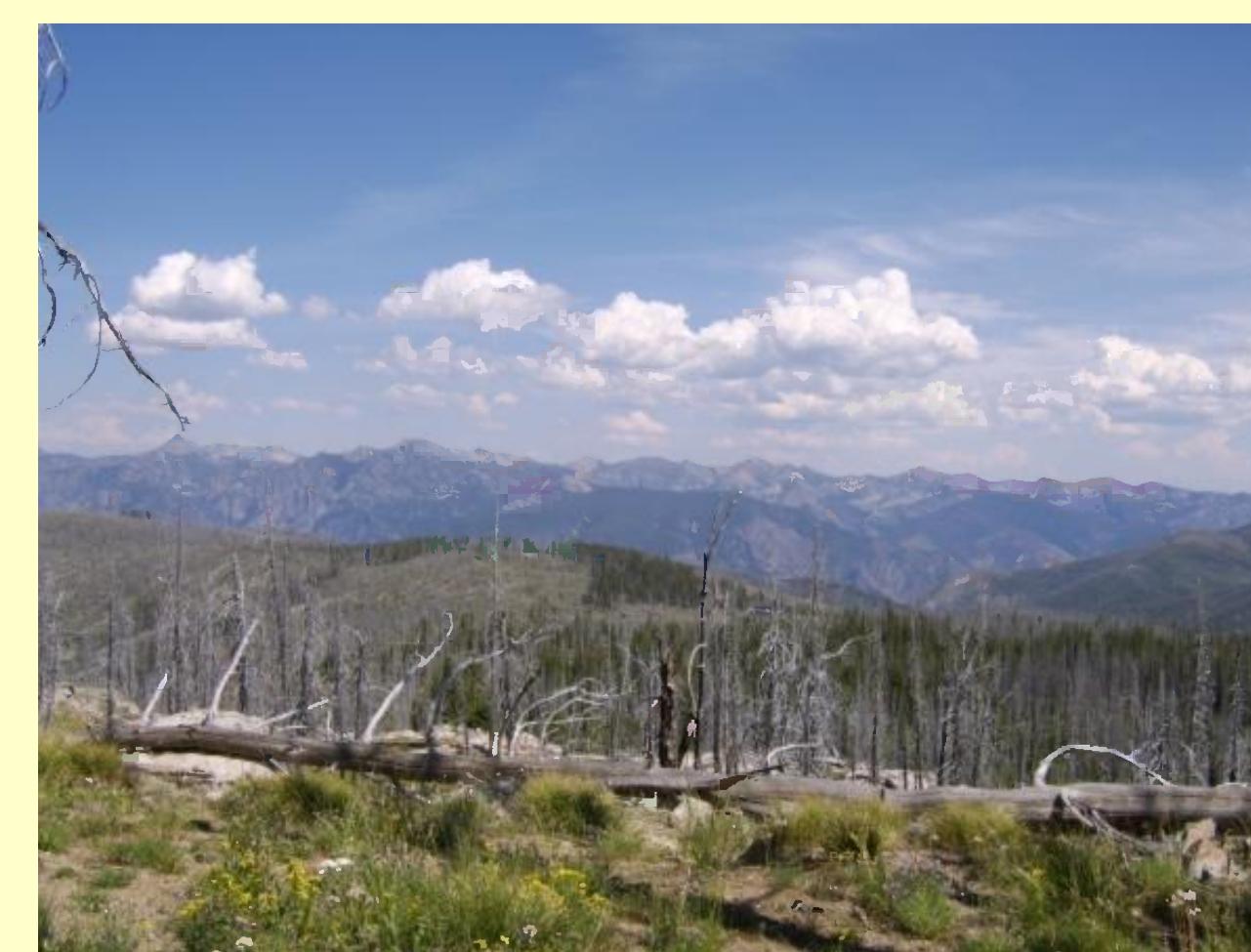
Whitebark pine (*Pinus albicaulis*) is a keystone species in subalpine zones of the western United States and southwestern Canada. Whitebark pine ecosystems provide valuable and crucial habitat for many wildlife species, including birds, squirrels and bears. Across the species' range, whitebark pine populations have been declining steadily due to white pine blister rust (*Cronartium ribicola*), mountain pine beetle (*Dendroctonus ponderosae*) infestation and successional replacement by subalpine fir (*Abies lasiocarpa*)⁴, 5. Efforts are being made across the range of whitebark pine to understand and record its ecosystem dynamics, including the role of wildland fire. In the summers of 2005-2008 we collected data on the status of whitebark pine populations in the Frank Church River of No Return Wilderness Area. This report summarizes preliminary results based on 2007 and 2008 data.



Objectives

The intent of this study is to provide information on fuel loadings and forest health, including disease incidence, mortality and reproduction in the Frank Church River of No Return Wilderness Area. Results may be used to complement existing research and restoration initiatives in whitebark pine ecosystems. Our specific objectives were to:

1. Establish permanent monitoring plots in whitebark pine stands to evaluate the dynamics of stand composition and health
2. Collect baseline data on whitebark pine stands to examine the influence of habitat type and fire history on the composition and health of stands
3. Identify potentially rust-resistant individuals
4. Collect baseline data on forest fuels in whitebark pine stands



Methods

Data Collection

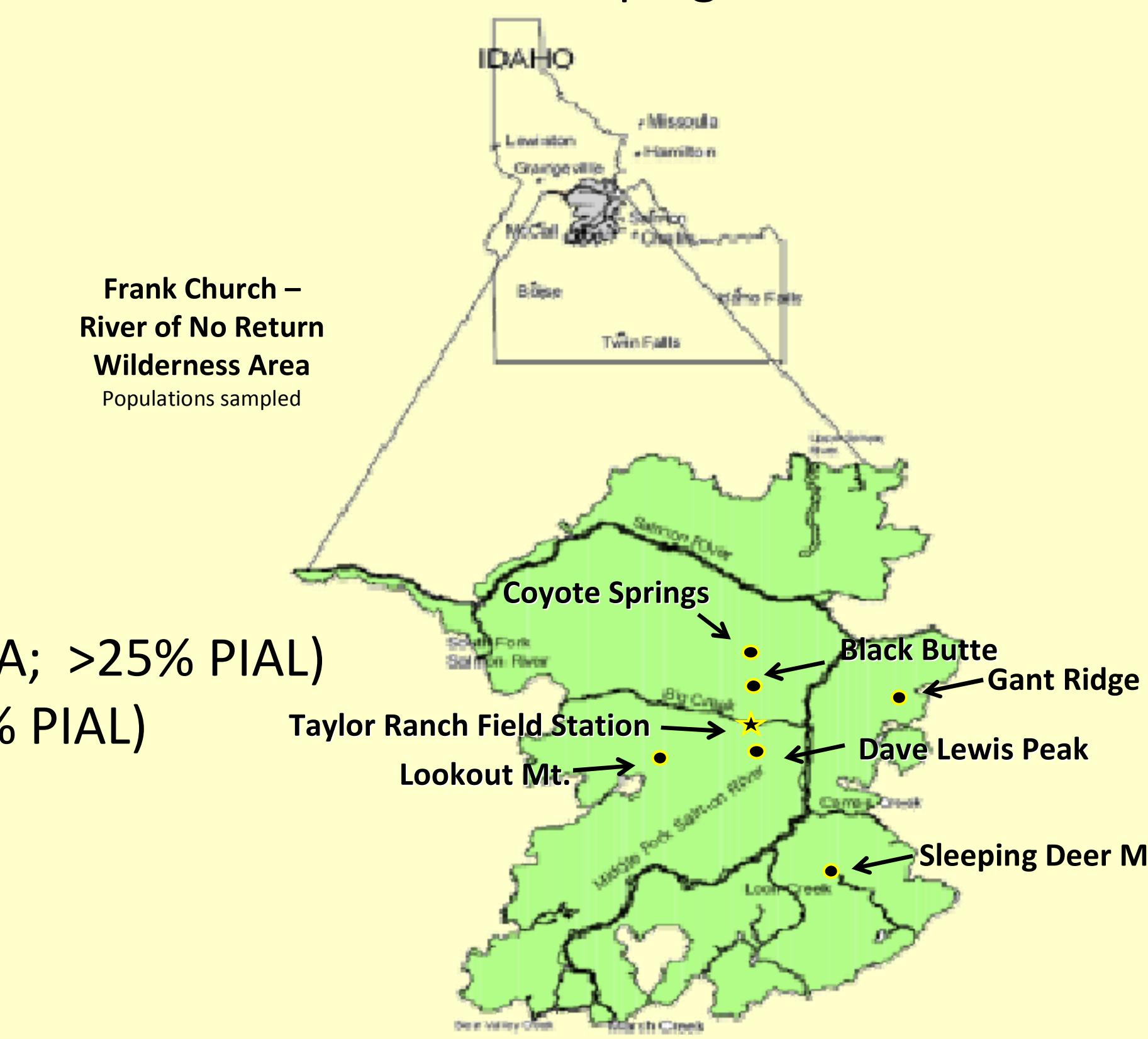
During the summer of 2008, we reevaluated 65 previously established plots across 4 populations and established and evaluated 54 new plots in 2 additional populations. Plots were categorized by burn history and stand composition. Plots are 150' x 30' rectangles in which all whitebark pine (WBP) trees 4.5' or taller were tagged. Evaluations include overall health, blister rust status, mountain pine beetle attack, bark damage, mortality, regeneration, vegetation, fuels and current and developing cones.

Burn Classes

Unburned (>100 yrs ago)

Old (15-100 yrs)

Young (< 15 yrs)



Habitat Classes

Pure (>85% PIAL)

Mixed Subalpine (>25% ALBA; >25% PIAL)

Mixed LPP(>25% PICO; >25% PIAL)

Data Analyses

Plot means for variables were tabulated in Excel 2007 and ANOVA was conducted using SAS 9.1. Pearson correlation coefficients were calculated among topographic and health variables. Where required, variables were transformed to meet assumptions of normality and homoscedasticity. Least-squares means of variables were calculated for each factor combination and Tukey's HSD test was used to assess significant differences within factor classes. All significance levels were set at $\alpha=0.05$.

Preliminary Results 2008

Variable	N _A /N _T	N _A /N _T Percent	Mean Percent in Affected Plots (SD)	Overall Mean Percent (SD)
WPBR infection	92/109	84.4	19.2 (12.4)	16.2 (13.4)
WPBR caused mortality	9/109	8.3	6.9 (5.7)	0.6 (2.4)
MPB attack	22/119	18.5	15.7 (14.5)	2.9 (8.7)
MPB caused mortality	51/119	42.3	14.8 (14.3)	6.3 (11.8)
Regeneration (<4.5ft)	110/119	92.4	N=36 (37)	N=33 (37)

N_A = Number of plots affected in 2008

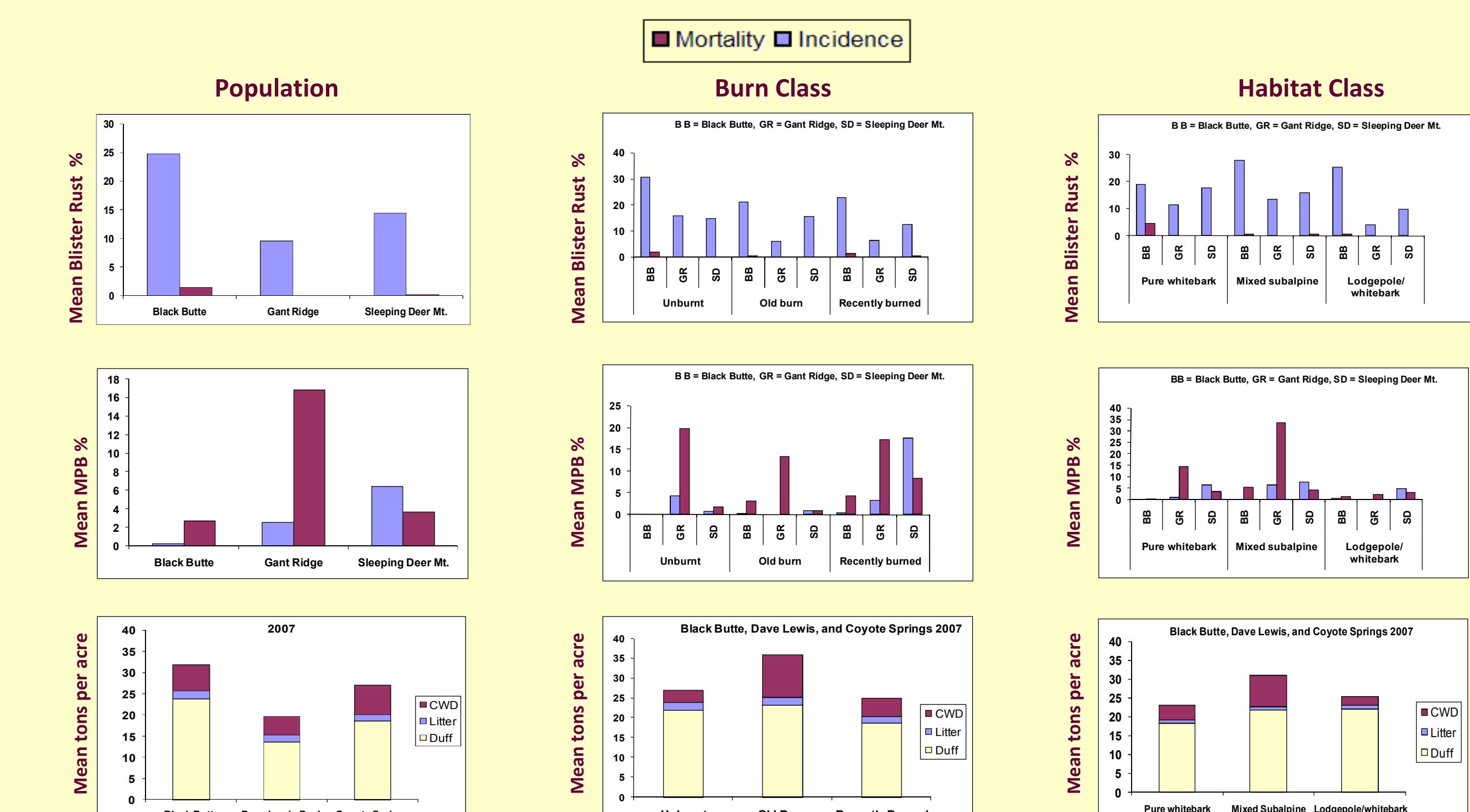
N_T = Number of plots inspected in 2008

Preliminary Results (continued)

2008 Means*

Pop	Blister Rust				Mountain Pine Beetle				Regeneration	
	I (SD)	R (SD)	M (SD)	R (SD)	I (SD)	R (SD)	M (SD)	R (SD)	N (SD)	NR (SD)
BB	24.8 (14.9)	0-50 (4.0)	1.5 (4.0)	0-16.7 (4.0)	0.2 (0.9)	0-4.8 (6.7)	2.7 (6.7)	0-33.3 (18)	15 (18)	0-67 (18)
CS	17.8 (11.7)	0-36 (4.0)	0 (4.0)	NA (12.2)	3.6 (10.8)	0-52 (4.4)	3.5 (4.4)	0-13.6 (24)	23 (24)	5-102 (24)
DL	7.4 (9.2)	0-25 (4.1)	1.9 (4.1)	0-11.1 (4.1)	4.1 (10.8)	0-28.6 (5.8)	5.9 (5.8)	0-13.6 (24)	17 (24)	0-68 (24)
GR	9.6 (11.3)	0-36.8 (4.0)	0 (4.0)	NA (7.0)	2.5 (7.0)	0-27.3 (19.1)	16.8 (19.1)	0-65.9 (128)	94 (128)	3-168 (128)
SD	14.4 (10.1)	0-44.4 (4.0)	0.2 (0.9)	0-4.6 (11.8)	6.4 (11.8)	0-39.1 (6.6)	3.6 (6.6)	0-27.8 (37)	36 (37)	3-160 (37)
LM	NA (NA)	NA (NA)	NA (NA)	NA (NA)	0.7 (1.5)	0-4 (3.3)	1.9 (3.3)	0-10.3 (17)	17 (17)	0-55 (17)

I = Infection/Infestation (%); R = Range; M = Mortality (%); N = Number of seedlings < 4.5'; SD = Standard Deviation



Additional Results

1. Significant differences

Blister rust infection between populations

Mountain pine beetle mortality between populations

Mountain pine beetle mortality between habitat class within populations

Regeneration between populations

Regeneration between habitat class and burn class at Gant Ridge

2. Significant correlations

Regeneration with slope ($r = .28$) and elevation ($r = .43$)

Regeneration with MPB mortality ($r = .46$)

Regeneration with density of WBP ($r = .33$)

3. Larger trees tended to have higher levels of blister rust infection and mountain pine beetle attack

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